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Research Article

Immunoinformatic Analysis of Calcium-Dependent Protein Kinase 7 (CDPK7) Showed Potential Targets for *Toxoplasma gondii* Vaccine

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Apicomplexan parasites, including *Toxoplasma gondii* (*T. gondii*), express different types of calcium-dependent protein kinases (CDPKs), which perform a variety of functions, including attacking and exiting the host cells. In the current bioinformatics study, we have used several web servers to predict the basic features and specifications of the CDPK7 protein. The findings showed that CDPK7 protein has 2133 amino acid residues with an average molecular weight (MW) of 219085.79 D. The aliphatic index with 68.78 and grand average of hydropathicity (GRAVY) with -0.331 score were estimated. The outcomes of current research showed that the CDPK7 protein included 502 alpha-helix, 1311 random coils, and 320 extended strands with GOR4 method. Considering the Ramachandran plot, the favored region contains more than 92% of the amino acid residues. In addition, evaluation of antigenicity and allergenicity showed that CDPK7 protein has immunogenic and nonallergenic nature. The present research provides key data for more animal-model study on the CDPK7 protein to design an efficient vaccine against toxoplasmosis in the future.

1. Introduction

Toxoplasma gondii is a prevalent intracellular protozoan, which can infect a broad spectrum of mammals (i.e., human) and birds [1, 2]. Oocysts are the potential infective form in the life cycle of the parasite. Feline species as the only definitive hosts can contaminate the environment by shedding unsporulated oocysts through feces [3]. *T. gondii* is transferred by water/vegetables contaminated via mature oocysts and consumption of raw or semicooked meat from infected animals, vertical transmission from infected pregnant mothers to neonates, and blood transfusion [4–7]. Approximately one-third of human society has been exposed to *T. gondii*, worldwide [5, 8, 9]. Often *T. gondii* infection among immunocompetent people is asymptomatic or demonstrates mild symptoms, whereas in immunocompromised patients, it can cause a various range of clinical symptoms [6, 9, 10]. Toxoplasmosis in immunocompromised subjects can cause repeated attacks in the brain and manifests as encephalitis [11]. Moreover, toxoplasmosis in pregnant women can cause blindness, microcephaly, and mental retardation in the infant [6, 12]. Different factors, such as host's